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Smart Hospital Cleaning and disinfecting robot using IOT

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Abstract

With the advancement of technology, robots are getting more attention of researchers to make life of mankind comfortable. This paper presents the design, development of project Smart Hospital Disinfecting Robot using IOT. The robot operates in autonomous mode as well as in manual mode along with additional features like scheduled time disinfecting and obstacle avoiding. This project will help the healthcare workers in process of cleaning and sanitization making the process autonomous. The main motive behind this project is to help reduce burden on healthcare system which is under pressure due to ongoing covid-19 crisis.
Keywords: *IOT, Arduino, Cleaning, Disinfecting, Robot, Sensors*

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I. Introduction

Now a days, the whole world is going through a pandemic which is caused by deadly corona virus also known as COVID-19. The first case of covid-19 was detected on 31st dec 2019 in wuhan, china and WHO declared it as pandemic on 13th mar 2020. This data shows that Covid-19 took less than 3 months to spread throughout the world this tells us the rapid spread of the deadly virus. Due to the rapid and unexpected spread, the healthcare system around world came under tremendous workload causing shortage of staff , overworked doctors, hospitals packed with patients, etc. This pandemic also showed us the importance of time to time cleaning of hospitals and disinfecting them. Without proper sanitization ,the virus can spread more aggressively.

For solving this issue, we are using a IOT controlled robot which will automatically clean the hospital floors and also disinfect floors and environment using Alcohol based solution and a UV light source .This IOT based system will ensure the clean and healthy environment in the hospital without putting any pressure or workload on the already overworked workforce of the hospital. This robot can also used at quarantine centers, airports, railway stations, hotels, government offices and many more public places. This robot will come with a obstacle avoiding mechanism, automatic mode , manual mode and also android controlled using IOT which will ensure that we are using all current technologies while developing the robot. This system will make whole cleaning and sanitizing process automatic and efficient which will help in reducing the spread of disease and making a safe and healthy environment.

II. LITERATURE REVIEW :

Title of Paper	**Details of Publication with Date and Year**	**Literature Identified for Project**
Design and Development of Floor Cleaner Robot	International Journal of Computer Applications Year of Publication: 2014 Authors: Manreet Kaur Preeti Abrol	➢ Floor cleaner robot can work in any of two modes i.e."Automatic and Manual". All hardware and software operations are controlled by AT89S52 microcontroller. ➢ This robot can perform sweeping and mopping task. This robot is incorporated with IR sensor for obstacle detection and automatic water sprayer pump. ➢ Four motors are used, two for cleaning, one for water pump and one for wheels. ➢ Dual relay circuit used to drive the motors one for water pump and another for cleaner.
Low Cost Autonomous Robot Cleaner using Mapping Algorithm based on Internet of Things (IOT)	IOP Conference Series: Materials Science and Engineering Year of Publication: 2020 Authors: R J Ong and K N F	➢ A low-cost solution is proposed in this study by using HC-SR04 ultrasonic sensor for obstacle avoidance and control by Arduino UNO. ➢ By using an autonomous vacuum cleaner, user can turn ON. ➢ The autonomous vacuum robot to clean without any

	Ku Azir	help of a human operator. ➢ Wall mapping and random mapping is being applied in this study to find the effective mapping algorithm for autonomous robot cleaner.
Building a mobile robot for a floor-cleaning operation in domestic environments	Publisher: IEEE Date of Publication: 27 September 2004 Authors: J. Palacin J.A. Salse	➢ In this paper, a floor-cleaning robot specifically designed for this function is proposed. ➢ Aspects such as sensor placement, motor control, robot control, and safety are considered toward an optimal implementation of this helpful robot.

Materials

- Arduino Uno
- HC-SR04 Sensor (4)
- Dual H-Bridge Motor Driver L298N
- 9V battery
- Jumper wires
- Geared DC Motor, 12 V

Software apps and online services

- Arduino IDE

Hand tools and fabrication machines

- Soldering iron (generic)
- Solder Wire, Lead Free
- **Tape, Double Sided**

Methods

It is an automated house cleansing robot with sanitization feature in it. Taking into consideration the global pandemic Covid-19 situation it is important to keep environment clean and healthy. So, we are trying to develop a robot which will be useful in Hospital, airport, quarantine center and railway station

- Semi Autonomous Mode
- Manual mode

Procedure:

1. When a robot is placed in the middle of the room then it will move forward to the wall and take 90 degree turn and then backward. Now the robot is in the corner.
2. When a robot is placed nearer to the wall of the room then it will move backward to the corner.
3. When the robot is in one of the corners then the working of the robot will start like cleansing and sanitization and in this way the robot will cover all the area of the room.

III. RESULTS

The objective of this project is to make a vacuum cleaning and disinfecting robot which is fully autonomous and manual featured with user friendly interface. The vacuum cleaner is able to clean, brush and auto dispose-off. It has variable speed and power efficient. It can sanitize the floor and surface effectively. The report of the robot showed that it can achieve almost all the functionalities which were planned to implement originally. It can be used in autonomous and manual modes as per user's will. During its autonomous mode, this robot can be scheduled with a proper date and time. When that time comes this product automatically starts and cleans the whole room and counter check pattern. When this robot completes the whole path it automatically cleans itself in the station from where it started cleaning. Moreover, manual mode is to save the energy of the robot and to clean the particular place. Customers are provided with the user friendly interface to operate the robot without any difficulty. It most importantly consumes extremely low energy which is 90W and take lead from the competitors. Vacuum cleaner has the reliable circuit and it has the safety circuit which rectifies different poles and restricts high voltage to affect the circuitry. However, the weakness of the robot is that it only cleans the small particles, it also doesn't find which particle to be cleaned and which is not to be cleaned. This robot also can't do wet cleaning. These two functions can be included in future enhancements of this robot. The evaluation shows that our product is reliable and cost effective. It works with less energy consumption.

IV. DISCUSSION

The solution we are proposing will be a combination of cleaning and sanitization process which will be totally carried out by a robot without any human interference making the whole process automated and efficient which can also be controlled by a android app using IOT. The robot will have features like obstacle avoidance, automatic and manual mode .And also our solution will be cost efficient. Making whole process of cleaning and disinfecting(sanitizing) of hospitals fully automated and efficient. Using various sensors and latest technologies. Which will help to reduce the workforce required in the hospital for cleaning and disinfecting process. It will replace traditional methods with our advanced solution. Ensuring the time to time sanitization of hospitals and various places and Designing a robot such that it is easy to control and easy to use. A device which requires negligible maintenance. Helping our health system by reducing their work and help our governments to achieve a smart city dream.

V. CONCLUSION

The major outcome will be that the process of cleaning and disinfection will become completely automated. The robot will reduce the workload of workforce in the hospitals. There will be no need of manual cleaning and disinfecting. Our system can also be deployed at various public places where will be need of time to time cleaning and disinfection. We will have a cost efficient product which will be easy to use with negligible maintenance need. This system further can be developed for outdoor use which will help various cities to make the sanitization process automated and efficient which will help us to achieve the smart city dream. This system will become an efficient solution for outdoor/ indoor needs of sanitization.

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